

## PATENT ABSTRACTS OF JAPAN

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(72)Inventor : NAKAMATSU YOSHIRO

## (54) LIFE RHYTHM CHANGING DEVICE

## (57)Abstract:

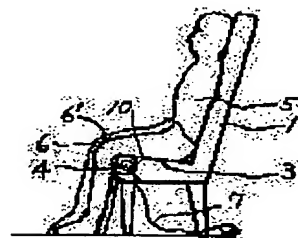
PROBLEM TO BE SOLVED: To easily adapt the body to an environment and the duty by quickening or delaying an internal clock by irradiating the strong light to the back of at least knees.

SOLUTION: The back of knees 6 of a user 5 seated on a chair 1 is irradiated by the light of a light emitter 4 by arranging the light emitter 4 such as a fluorescent tube lamp in the front end part of a seat 3 of the chair 1.

Alternatively a similar light emitter 4 is arranged in a corresponding place in a rear position of the knees 6 of the user lying on his side in a bed. Thus, when the light is irradiated to the back of the knees 6, a change in a body temperature and melatonin can be shifted by about three hours at its maximum. Then, when performed on a night worker, the body is adapted to the duty by changing an internal clock of the night worker in sleep.

When traveling abroad, the internal clock is adjusted so as to coincide with the time of one's destination before the arrival. Since the back of the knees is heated by

irradiation of the light, the circulation of the blood is promoted to quickly recover from fatigue.



## LEGAL STATUS

[Date of request for examination] 26.02.1998

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decision of rejection]

[Date of extinction of right]

05.02.2004

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**CLAIMS**

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[Claim(s)]

[Claim 1] Life rhythm modification equipment characterized by light hitting behind in the knees at least.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] To a life rhythm, i.e., the equipment into which waking, appetite, etc. are changed, it sleeps and this invention relates.

[0002]

[Description of the Prior Art] It was thought that the biological clock which governs life rhythms, such as sleep, waking, and appetite, was conventionally adjusted with the light which enters from an eye, and the attempt which applies light to an eye and adjusts a biological clock was made. However, since the totally blind man also had a jet lag, the relation between an eye and a biological clock is unknown, and accommodation of an effective biological clock was not completed with the conventional technique.

[0003]

[Problem(s) to be Solved by the Invention] Obtain not light but the equipment which can be adjusted from an eye for a biological clock.

[0004]

[Means for Solving the Problem] Carry forward or delay a biological clock by applying a light strong behind in the knees at least.

[0005]

[Embodiment of the Invention] Light is applied behind seat beam people's knee, or light is applied to the part behind a sleeping person's knee.

[0006]

[Example] 30 22-67-year-old man and woman were made to live in a gloomy laboratory for four days, and the amount of secretion of temperature and Melatonin (hormone) was measured. Temperature is low in high the night daytime. Many [ to night / there is little Melatonin which, on the other hand, has the close relation to sleep daytime, and ] became clear. 15 persons sat on 15 each of the beds 2 shown in the chair 1 indicated to be four days to drawing 1 , and drawing 2 , respectively, or it was lain and used for them. The emitters 4, such as a fluorescence tube lamp, are formed in the front end of a seat 3 at a chair 1. Moreover, an emitter 4 is formed on a bed 2. It was made to irradiate the back of a user's 5 knee 6 by the light of an emitter 4 in this way. 7 is the power cord of an emitter 4. 6' is the blanket or bedding of protection-from-light nature which covers a knee at least.

[0007] The four days are used from 0:00 a.m. to noon, and it was made not to sleep only on the 2nd. Between them, the time zone was changed into eight persons of a chair, and eight persons of a bed like before, light was applied to the backside in the knees, and light was not applied to other seven persons each at all. Consequently, although the rhythm of the biological clock of the person who did not apply \*\*\* did not change, as for the person who applied light to the knee, change of temperature or Melatonin had shifted before or after a maximum of 3 hours.

[0008] Namely, although the person who applied light behind in the knees from 1:00 a.m. to 4:00 was at average 4:04 a.m. before the time of day when temperature is the lowest irradiating, it will be after an activity at average 7:08 a.m., and it was overdue for 3 hours and 4 minutes.

Moreover, although the person who applied light behind in the knees from 6:00 a.m. to 9:00 was

at average 7:13 a.m. before the time of day when temperature is the lowest irradiating, after the activity became early to average 4:53 a.m. for 2 hours and 20 minutes. It became clear that \*\*\* of a biological clock can be adjusted by this by the time zone which applies light behind in the knees.

[0009] Drawing 3 and drawing 4 show this invention example which set to the longitudinal direction the lamp 9 of this invention which irradiates the bottom of a sleeping person's knee in a bed mat or a futon 8. A lamp 9 is long and slender fluorescence tubing etc., it fixes in the case 10 which reflects light inside, and light illuminates the bottom of a knee effectively. A sheet 11 uses as a transparence sheet the part 12 with which the object with the thin whole or lamp 9 of translucency compares the bottom of a knee. In the power cord 7 of a lamp 9, 13 is a timer and 14 is a power receptacle.

[0010] Drawing 5 and drawing 6 are this invention product examples used putting on a bed mat or a futon, the underside of the cylinder 15 of the cross-section \*\*\*\* semicircle which inserted in the lamp 9 in the translucency plastics cylinder 15 is put on a bed or a bedding side, it does not shift, but is stabilized [ cloth etc. sticks 16 by the plane, ], and a top face goes into the bottom of the knee of the foot put since it upheaves round.

[0011] Drawing 7 and drawing 8 are this invention examples of the shape of a mat 17 put on the seat of a chair, form protection-cum-the reflecting plate 18 behind the light 9 of the front end lower part, and irradiate the back of people's knee that a lamp 9 sits on a chair. 19 is a belt fixed to a chair.

[0012] this invention example is shown, and a belt 21 is formed in the field-like light 20 which illuminates back in the knees, a belt 21 is twisted around a foot joint, and drawing 9 and drawing 10 also fix it so that the light of a light 20 may illuminate back in the knees. The Velcro fastener 22 of a couple is formed in the ends of a belt 21, and it enables it to detach and attach easily. 23 is the \*\* dc-battery of the light power source fixed to the back of a light 20 which can be charged.

[0013] The surface light source is chosen as arbitration from \*\*, such as a vacuum-pipe type luminescence LGT, LED, and a back light for LCD, and these are also contained in this invention. Moreover, it is contained in this invention also when the energization timer which sets up the irradiation time of an energization light is made to build in. Moreover, also when the light source explained to be a fluorescent lamp in the above is used as the tungsten LGT and infrared LGT accompanied by generation of heat, it is contained in this invention, and there is the warm temperature effectiveness in this case.

[0014]

[Effect of the Invention] By this invention, during sleep, the day and night of a night shift person's biological clock are changed without putting in outdoor daylight at an eye, even if it makes itself adapt to service and there is no sun at the time of an overseas voyage, before arrival, a biological clock can be adjusted so that the time of day of the destination may be suited, and the body can be easily accommodated to an environment or service. Moreover, back in the knees has the thin skin, and since blood vessels have gathered, this invention — this can be hit in the heat accompanying light, \*\* and circulation are promoted, fatigue is recovered promptly, and effectiveness, such as improving work of the head, can be united — is very significant invention on everyday life.

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**TECHNICAL FIELD**

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**PRIOR ART**

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**EFFECT OF THE INVENTION**

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**TECHNICAL PROBLEM**

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**MEANS**

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**EXAMPLE**

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[Example] 30 22-67-year-old man and woman were made to live in a gloomy laboratory for four days, and the amount of secretion of temperature and Melatonin (hormone) was measured. Temperature is low in high the night daytime. Many [ to night / there is little Melatonin which, on the other hand, has the close relation to sleep daytime, and ] became clear. 15 persons sat on 15 each of the beds 2 shown in the chair 1 indicated to be four days to drawing 1 , and drawing 2 , respectively, or it was lain and used for them. The emitters 4, such as a fluorescence tube lamp, are formed in the front end of a seat 3 at a chair 1. Moreover, an emitter 4 is formed on a bed 2. It was made to irradiate the back of a user's 5 knee 6 by the light of an emitter 4 in this way. 7 is the power cord of an emitter 4. 6' is the blanket or bedding of protection-from-light nature which covers a knee at least.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The side elevation of the 1st example of this invention

[Drawing 2] The side elevation of the 2nd example of this invention

[Drawing 3] The 3-3 line sectional view of drawing 4 of the 3rd example of this invention

[Drawing 4] The top view of the 3rd example of this invention

[Drawing 5] The 5-5 line sectional view of drawing 6 of the 4th example of this invention

[Drawing 6] The top view of the 4th example of this invention

[Drawing 7] The 7-7 line sectional view of drawing 8 of the 5th example of this invention

[Drawing 8] The top view of the 5th example of this invention

[Drawing 9] The plan of the 6th example of this invention

[Drawing 10] The development view of drawing 9

[Description of Notations]

6 Knee

4, 9, 20 What emits light

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[Translation done.]

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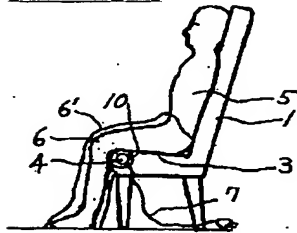
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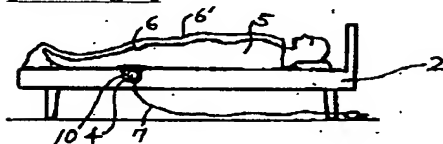
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## DRAWINGS

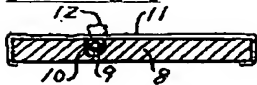
[Drawing 1]



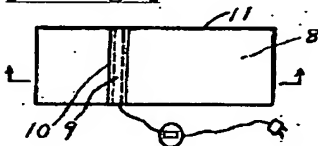
[Drawing 2]



[Drawing 3]



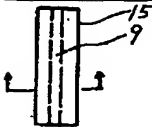
[Drawing 4]



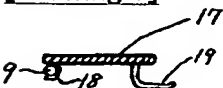
[Drawing 5]



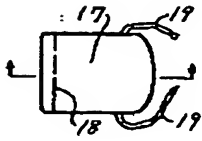
[Drawing 6]



[Drawing 7]



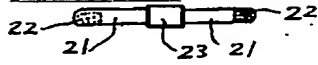
[Drawing 8]



[Drawing 9]



[Drawing 10]



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[Translation done.]

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21/00

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平成10年(1998) 2月23日

(71) 出願人 000211569

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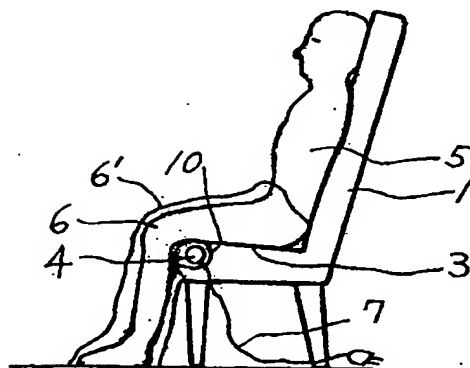
東京都港区南青山5丁目1番10-1105号

(54) 【発明の名称】 生活リズム変更装置

(57) 【要約】

【課題】 生活リズムを律する体内時計の経時を変えること。

【解決手段】 膝の後ろの脚面に時間帯を変えて光を当てることにより体内時計を調節する。





【特許請求の範囲】

【請求項1】少なくとも膝の後ろに光が当たることを特徴とした生活リズム変更装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、生活リズムつまり眠り、目覚め、食欲などを変える装置に関する。

【0002】

【従来の技術】眠り、目覚め、食欲などの生活リズムを支配する体内時計は、従来、目から入る光で調節されることが考えられてきて、目に光を当てて体内時計を調節する試みがなされた。しかし全盲の人にも時差ボケがあることなどから、目と体内時計との関係が不明であり、従来技術では有効な体内時計の調節ができなかった。

【0003】

【発明が解決しようとする課題】体内時計を目からの光ではなくて調節できる装置を得ること。

【0004】

【課題を解決するための手段】少なくとも膝の後ろに強い光を当てることにより、体内時計を進めたり、遅らせたりすること。

【0005】

【発明の実施の形態】腰掛けた人の膝の後ろに光を当てたり、就寝者の膝の後ろの部位に光を当てる。

【0006】

【実施例】22～67才の男女30人に4日間、薄暗い実験室で暮らさせ、体温とメラトニン（ホルモン）の分泌量を測定した。体温は昼間高く夜間低い。一方眠りと深い関係があるメラトニンは、昼間少なく、夜間に多いことが判明した。4日間とも、図1に示す椅子1および図2に示すベッド2の各15台に、それぞれ15人が腰掛け、または横たわって使用した。椅子1には、座席3の前端に蛍光灯等発光体4を設ける。また、ベッド2上に発光体4を設ける。かくして使用者5の膝6の後ろを発光体4の光により照射するようにした。7は発光体4の電源コードである。6'は少なくとも膝をおおう遮光性の毛布または布団である。

【0007】その4日間とも午前零時から正午まで使用し、2日目だけは眠らないようにした。その間に、椅子の8人とベッドの8人には、従来のように時間帯を変えて膝の後ろ側に光を当て、他の各7人には全く光を当てなかった。その結果、光を当てなかった人の体内時計のリズムは変化しなかったが、膝に光を当てた人は体温やメラトニンの変化が最大3時間前後にずれていた。

【0008】すなわち、午前1時から4時迄、膝の後ろに光を当てた人は、体温が最も低い時刻が照射前は平均午前4時4分であったが、使用後は平均午前7時8分であり、3時間4分遅れた。また、午前6時から9時迄、膝の後ろに光を当てた人は、体温が最も低い時刻が照射前は平均午前7時13分であったが、使用後は平均午前

4時53分へと2時間20分早くなった。これにより、膝の後ろに光を当てる時間帯により体内時計の遅進を調節しうることが明らかとなった。

【0009】図3、図4はベッドマットまたは敷布団8において、就寝者の膝の下を照射する本発明のランプ9を横方向にセットした本発明実施例を示す。ランプ9は細長い蛍光灯などであり、内面で光を反射するケース10の中に固定し、光が有効に膝の下を照らすようになっている。シーツ11は全体が透光性の薄い物かランプ9が膝下を照らす部分12を透明シートとする。ランプ9の電源コード7において13はタイマ、14は電源コンセントである。

【0010】図5、図6はベッドマットや敷布団の上に乗せて使用する本発明製品実施例であり、透光性プラスチック筒15の中にランプ9を装入した断面はほぼ半円の筒15の下面は平面状で布等16を貼り、ベッドや布団面に乗せてずれず安定し、上面は丸く隆起するので乗せる脚の膝の下に入る。

【0011】図7、図8は椅子の座席に乗せるマット状17の本発明実施例であり、前端下部のライト9の後ろに保護兼反射板18を設け、ランプ9が椅子に坐る人の膝の後ろを照射するようになっている。19は椅子に固定するベルトである。

【0012】図9、図10も本発明実施例を示し、膝の後ろを照らす面状ライト20にベルト21を設け、ベルト21を脚関節に巻きつけ、ライト20の光が膝の後ろを照らすように固定する。ベルト21の両端には一対のベルクロファスナー22を設けて容易に着脱できるようにする。23はライト20の後部に固定したライト電源の充電可能等バッテリーである。

【0013】面光源は真空管式発光灯、LED、LCD用バックライト等々から任意に選ばれ、これらも本発明に含まれる。また、通電ライトの照射時間を設定する通電タイマを内蔵させた場合も本発明に含まれる。また、前記において蛍光灯と説明した光源を発熱を伴うタングステン灯や赤外灯とした場合も本発明に含まれ、この場合温熱効果がある。

【0014】

【発明の効果】本発明により、睡眠中に夜勤者の体内時計の昼夜を、外光を目に入れることなく変化して勤務に順応させたり、また、海外渡航時、太陽がなくても到着前に体内時計を目的地の時刻に合うように調整することができて身体を環境や勤務に容易に順応させることができる。また、膝の後ろは皮膚が薄く、血管が集合しているので、これに光に伴う熱が当たれば、血行を促進して、疲労を速やかに回復し頭の働きを良くするなどの効果をあわせ得ることができるなど、本発明は実生活上きわめて有意義な発明である。

【図面の簡単な説明】

【図1】本発明第1実施例の側面図

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【図 2】本発明第 2 実施例の側面図

\* 【図 8】本発明第 5 実施例の平面図

【図 3】本発明第 3 実施例の図 4 の 3 - 3 線断面図

【図 9】本発明第 6 実施例の上面図

【図 4】本発明第 3 実施例の平面図

【図 10】図 9 の展開図

【図 5】本発明第 4 実施例の図 6 の 5 - 5 線断面図

【符号の説明】

【図 6】本発明第 4 実施例の平面図

6 膝  
\* 4、9、20 発光するもの

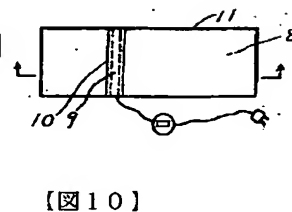
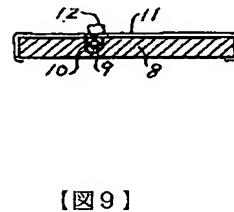
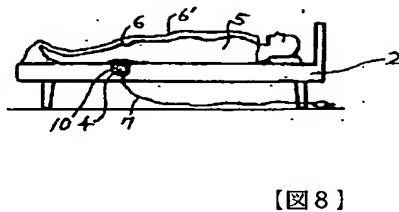
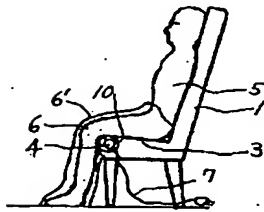
【図 7】本発明第 5 実施例の図 8 の 7 - 7 線断面図

【図 1】

【図 2】

【図 3】

【図 4】



【図 8】

【図 9】

【図 10】

【図 5】

【図 6】

【図 7】

